# Using GIS as a Tool to Enhance Community Involvement

**Environmental Science Program**
**NCCU**

THE POWER OF MAPS

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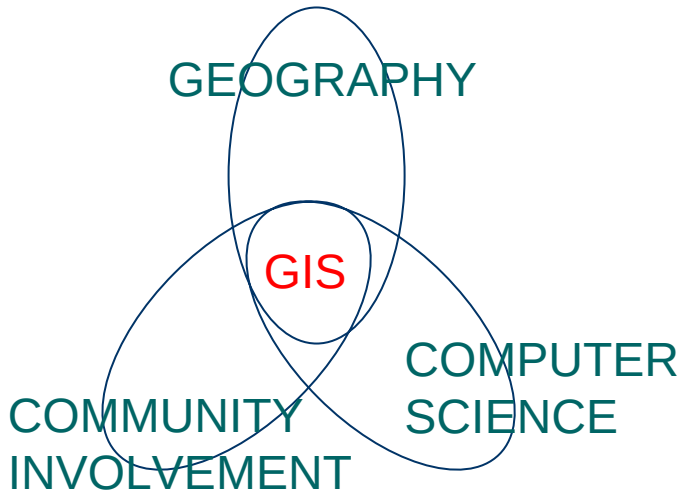
# Introduction

- Rakesh Malhotra, PhD
  - University of Georgia
  - Post-doctoral Associate, North Carolina Central University
  - ESRI Authorized Instructor since 1997 (This is not an ESRI course)
  - Primarily use and favor ESRI software
    - ArcGIS (desktop)
    - ArcIMS, ArcSDE, (server based)

# Goals

- GOALS
  - GIS “BASICS”
  - GIS is at the confluence of:
    - Geography
    - Computer Science
    - Community Involvement
  - Right software
  - Good Data sources



# Expectations

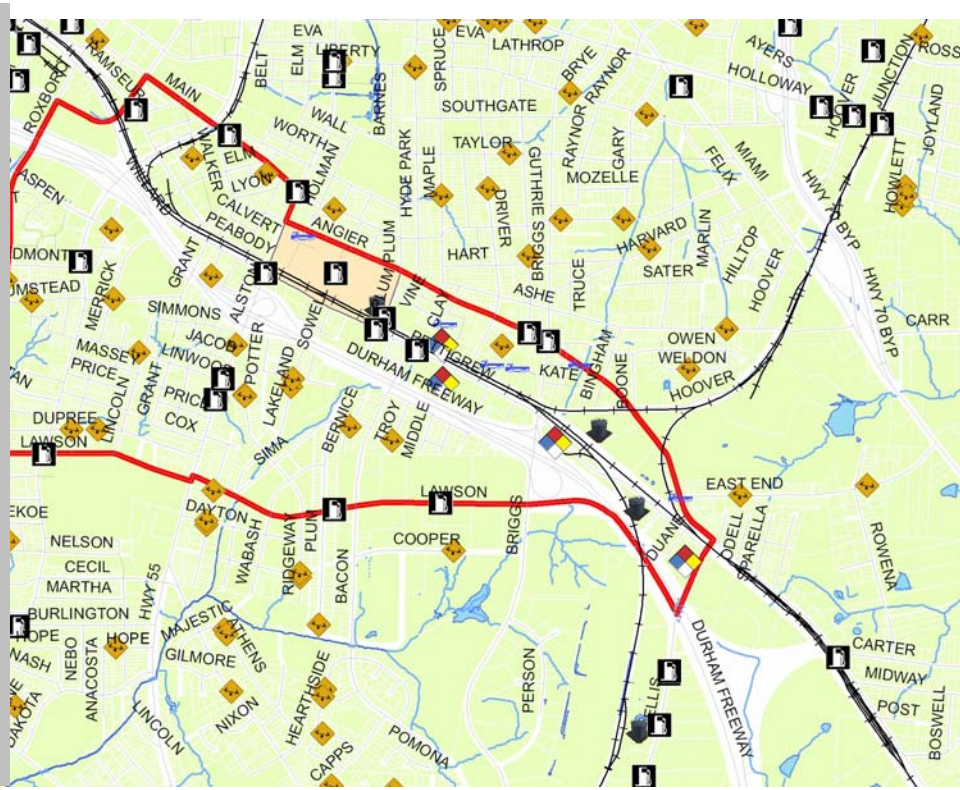
- EXPECTATIONS
  - Introduction to the subject
  - “Tip of the iceberg”
  - Emphasis on fundamentals / foundation
  - Demonstration uses:
    - Free software (ArcExplorer)
    - Simple data layers (County based dataset)
    - Basic techniques (Mapping, Visual perspective)

# GIS Concepts

- Map
- Scale
- Raster and Vector (Basic Data Structures)
- Layers of information
- Two components - Graphic and Attributes
- Three types of vector data

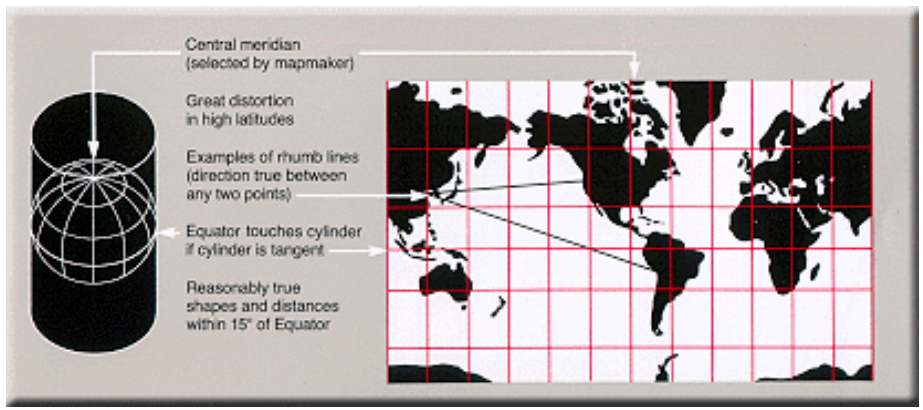
# GIS Concepts (MAP)

- A map is a model – a model of reality
- A map contains specific information
- Information on the map may be graphic (geometry) or text (attributes)
- A map consists of layers
- A map contains additional information such as Scale, Title, North Arrow



# GIS Concepts (PROJECTION)

- Map Projection – a mathematical relationship that converts spherical coordinate systems (lat / long) to rectangular coordinate system (x / y)




  - http://erg.usgs.gov/isb/pubs/MapProjections/projections.html

# GIS CONCEPTS (SCALE)

- A map is a model and scale represents the ratio of shrinkage
- Three important factors:
  - SCALE
  - PAPER SIZE
  - EXTENT

$$SCALE = \frac{EXTENT}{PAPER\ SIZE}$$

(SMALL SCALE)

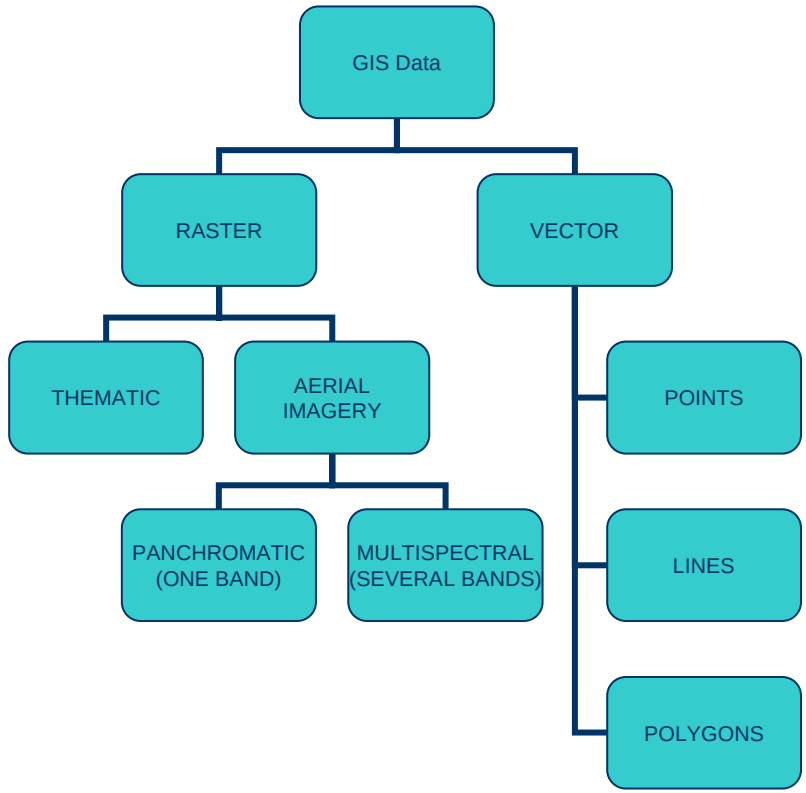
1:1000

1:100

(LARGE SCALE)

# GIS CONCEPTS (RASTER/VECTOR)

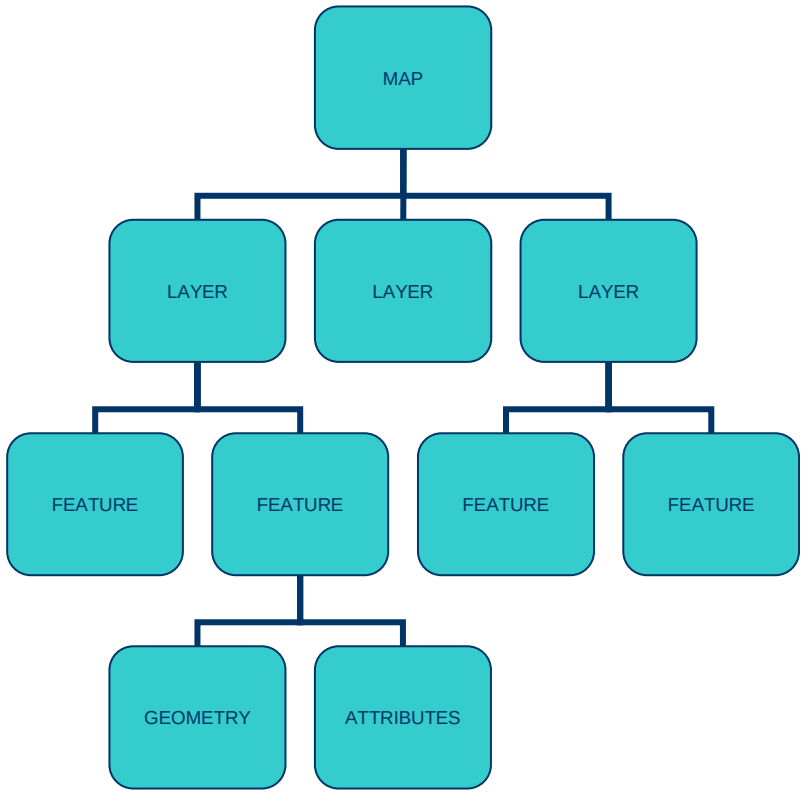
- Raster
  - Pixels
  - Continuous Data
  - Resolution Dependent
- Vector
  - Points / Lines / Polygons
  - Discrete Data
  - Resolution Independent (but based on scale of original data)




**DEMO – GOOGLE MAPS**

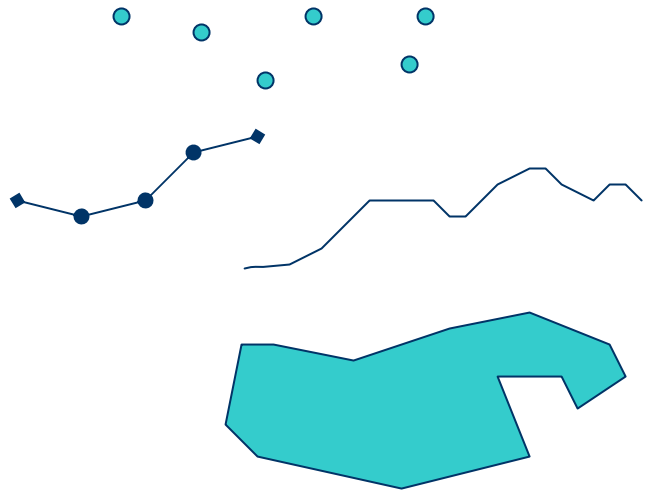
# GIS CONCEPTS (LAYERS OF DATA)

- MAP HEIRARCHY
  - One map can (and usually does) contain several “LAYERS” of data
  - A layers consists of “SIMILAR” features
  - Features have “GEOMETRY” and “ATTRIBUTES”



# GIS CONCEPTS (VECTOR DATA)

- POINT - Basic “building block”
  - X, Y coordinate
  - school (on a city map)
  - city (on a country map)
- LINES – collection of points
- POLYGONS – collection of points with same start and end



- Scale dependent
- Everything is a polygon

# Levels of a GIS

- Data collection
- Mapping
- Data Analysis
- Programming

# Levels of a GIS (Data collection)

- Digitizing
  - Converting paper maps layers to digital layers
- GPS
  - Sampling site
  - Reconnaissance
- Aerial / satellite imagery (data compilation)
  - Area delineation
  - Site assessment

# Levels of a GIS (Mapping)

- Present information / visual perspective
- Use of cartographic principles
- Ancillary information such as legend, descriptive text, scale are used to enhance information provided by the two main components (graphic and attributes)

# Levels of a GIS (Data Analysis)

- Relationships between layers of information
- Location analysis
- Proximity analysis
- Cluster analysis

# Levels of a GIS (Programming)

- Stringing tasks together
- Repetition
- Simplifying use by creating tools / button clicks that are easier for new users
- Scripting / Visual models / Computer Programs
- Caution: Sometimes the underlying complexity is lost to the user

# Components of a GIS

- Software
- Hardware
- Data
- People
- Procedures

# Components of a GIS (Software)

- The “S” in the GIS
- Several available, some generic and some specialized; some proprietary some open source
- Two basic versions – Desktop and Client/Server
- Tightly coupled to the OS / Hardware

# Components of a GIS (Hardware)

- Two basic types
  - PC
    - Word processing, etc.
  - Server
    - Email, Web, etc.
- GIS (ESRI software) has both (PC and server) options

# Components of a GIS (Data)

- The “GI” in GIS
- Each software has a native type
- For example, ArcGIS
  - GEODATBASE
    - Personal (PC based)
    - Enterprise (Server based)
- ArcView
  - Shapefile (actually a collection of at least 3 files)

# Components of a GIS (Procedures)

- Akin to GIS Functions
  - Data collection
  - Mapping
  - Data Analysis
  - Programming

# GIS Data Sources

- US Census
- City/County GIS Department
  - http://www.ci.durham.nc.us/departments/gis/
  - http://www.lib.ncsu.edu/gis/counties.html
- Internet
  - www.nationalatlas.gov
  - www.geographynetwork.com
- Data Clearinghouses
  - Search “GIS data clearinghouse”

# GIS as Applied to Community Involvement

- Visual perspective to the information
- Who is affected?
- What is there?
- Where are things located?
- And more

# Software

- ArcExplorer (GIS Data Viewer)
  - http://www.esri.com/software/arcexplorer/index.html
  - Free Download
  - ESRI (Creator of GIS software)
- GeoMedia Viewer (GIS Data Viewer)
  - http://www.intergraph.com/gviewer/
  - Free Download
  - Intergraph (Creator of GIS software)

# Software / Data Demonstration

- Download ArcExplorer
- Work with some GIS Data
- CD can be provided